# Development of a Customizable Software Application for Medical Imaging Analysis and Visualization

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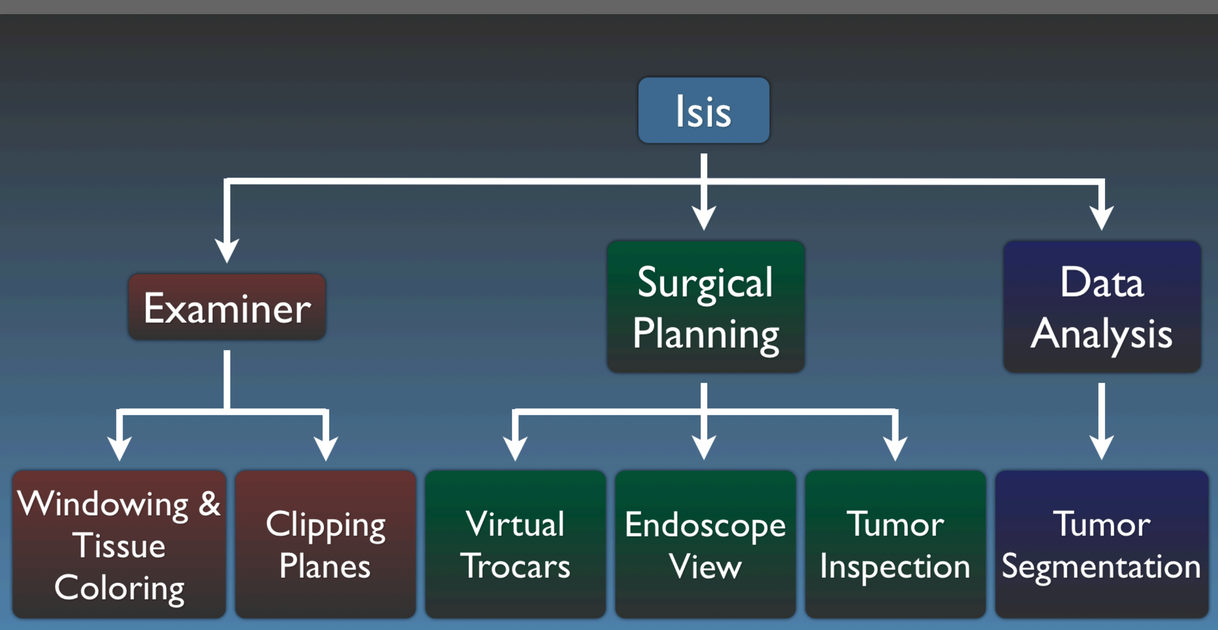
## Purpose

Develop a unique imaging software that is highly customizable and targeted at general physicians as well as medical professionals

## Background

- Medical imaging and graphics technology are expanding to include more advanced tools
- Surgeons and doctors can perform data visualization, analysis, and diagnosis outside traditional radiology
- However, software packages are not developed for Human Factors and tends to be unusable or require a steep learning curve




## Software Libraries

- QT - Interface design and implementation
- DCMTK - Medical image data processing
- Visualization Toolkit (VTK) - 2D and 3D rendering

## Features and Plug-ins

*Core:*

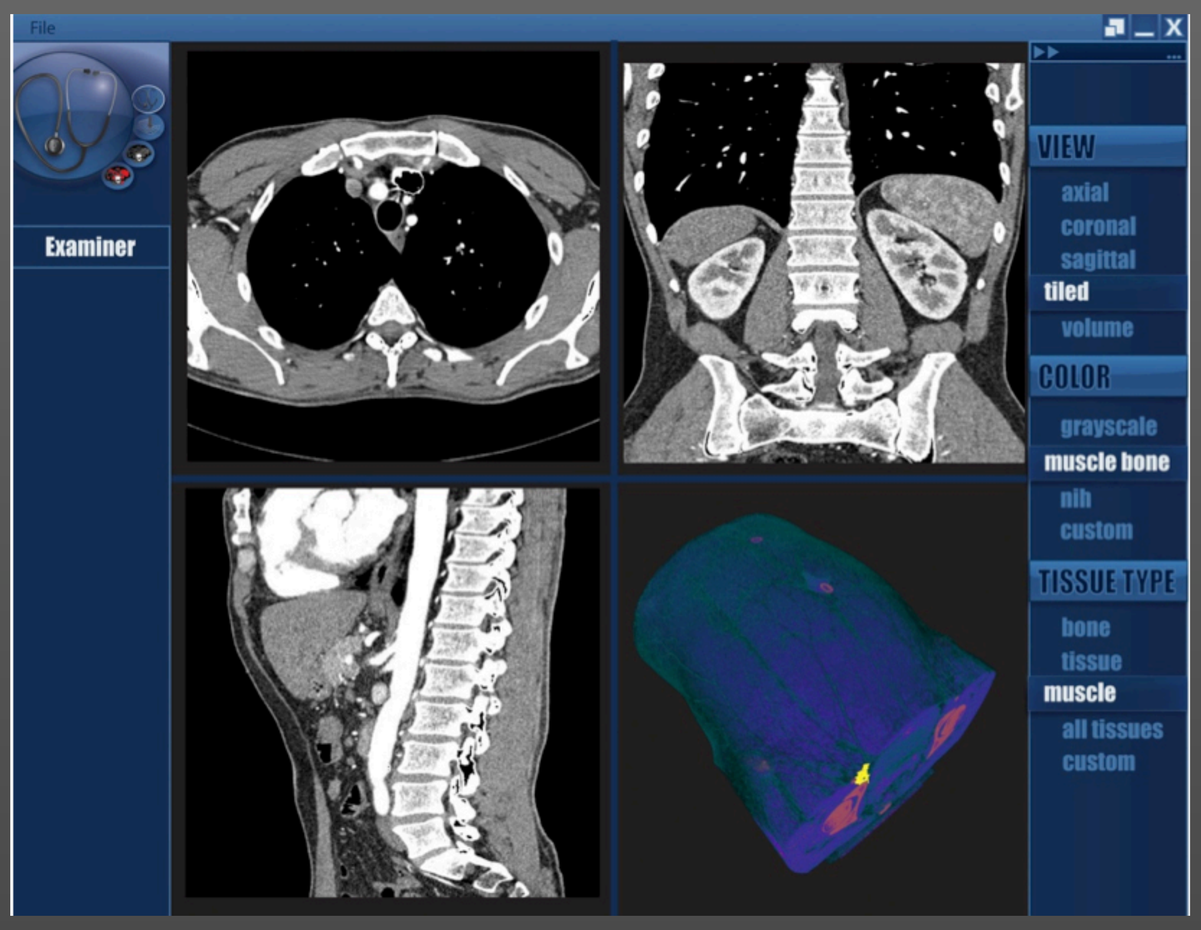
- 2D and 3D viewing
- Clipping planes for interior viewing of volume
- Tissue type selection
- Coloring of structures based on tissue densities

*Plug-ins*:

- Tumor segmentation
  - Segmentation algorithm including; fuzzy segmentation algorithm, probabilistic segmentation algorithm, and a colorization method based on regions of interest
- Surgical planning
  - Segmented tumor overlaid on original patient data to show shape and size relative to critical anatomical structures

## Display and Interaction Widgets

- Main window for display of 2D and 3D representations
  - User interaction by rotating, translating, and zooming
- Common features panel on the right for quick access
  - View - 2D and 3D views
  - Color - color schemes to highlight anatomical features
  - Tissue Type - window settings to isolate specific densities of bone, muscle, cartilage, etc
- Plug-in panel on the left
  - The circular menu indicates the plug-ins available to the user, with the active plug-in shown in the center
  - Plug-in specific features will appear below the circular menu




## Conclusion

- Plug-ins allow personalization for specific needs and preferences catering to first year medical students and practicing physicians
- Formal usability studies planned for the user interface and various features built into Isis
- Usability study and cognitive load testing will be evaluated to ensure interface does not hinder the users performance

## Future Implementations

Measurement tools

- Size of tumors

Landmark placements

- Distance of critical structures

Virtual trocar placement for laparoscopic surgery planning or incision locations in open surgeries

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